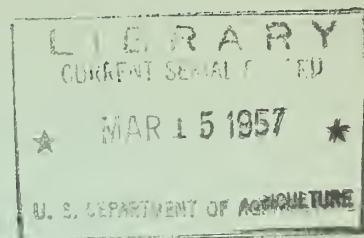


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

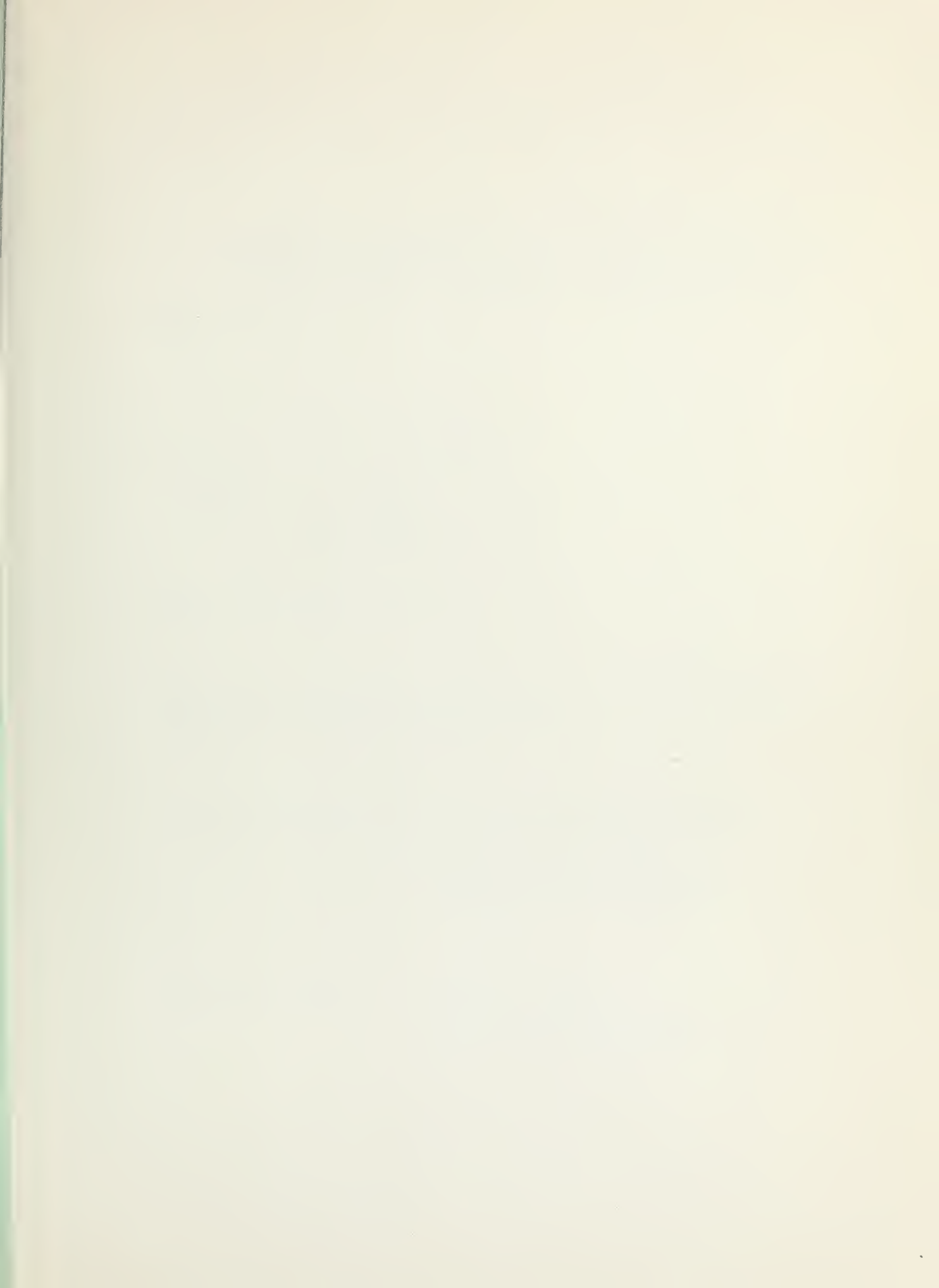
A333.9
A.27
Cip. 2



Aircraft and
Special Equipment
CENTER 

✓✓
ANNUAL REPORT
1951-1952

UNITED STATES DEPARTMENT OF AGRICULTURE
✓ **BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE**
AGRICULTURAL RESEARCH ADMINISTRATION





AIRCRAFT AND SPECIAL EQUIPMENT CENTER
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

Director: Kenneth Messenger

Assistants: John S. Riss
Donald Whittam
Arthur Gieser

Secretary: Helen Wetherell

Business Administration under Direction of W. S. Edwards -
Administrative Officer, Region III

Headquarters Office: Room 724 Insurance Building
114 North Broadway
Oklahoma City, Oklahoma
Telephone: Regent 6-5601

Shops and Hangar: Cimarron Field
(20 miles west of Oklahoma City)
Telephone: Yukon 4-9951

TABLE OF CONTENTS

	Page
Origin and Functions	1
Organization	5
Cooperative Activities	9
Educational and Informational Services	18
Vehicle Inventory	26
Aircraft Maintenance and Modification	29

CHARTS

Organization Chart	7
Aircraft Assignments 1952	12
Time Flown by States 1952	25
Description of BEPQ Aircraft	40
Time Flown by Bureau Aircraft 1951-1952	41
Cost of Operations 1952	42

SECTION I

ORIGIN AND FUNCTIONS of the AIRCRAFT AND SPECIAL EQUIPMENT CENTER

For several months prior to the establishment of the Aircraft and Special Equipment Center March 1, 1951, emphasis had been given to a study of equipment-use trends and their relationship to Bureau equipment problems. Through this study it was recognized that:

- (1) Aircraft application methods had been developed to a degree that would permit much of the Bureau's aircraft control work to be done by contract.
- (2) More experimental aircraft work in connection with research needed to be done.
- (3) A consolidation of aircraft would result in better utilization of pilots and aircraft mechanics.
- (4) A greater knowledge of commercial equipment being currently developed would reduce requirements for special design and construction.
- (5) A consolidation of aircraft and ground equipment shops would reduce expenditures.
- (6) Greater effort should be expended toward achieving a better utilization of all vehicles and special equipment.

Action was taken toward accomplishing these things when Avery S. Hoyt, Chief of the Bureau, announced on February 13, 1951 as follows:

"Effective March 1, 1951, the Bureau of Entomology and Plant Quarantine is establishing a unit to provide for better coordination and utilization of the Bureau's equipment, especially aircraft, automotive vehicles, pest-control machinery, and other special purpose machines.

"With respect to aircraft, this unit, the Equipment Management Center, will have direct responsibility for the procurement, assignment, modification, and disposition of all aircraft used by the Bureau. It will help develop specifications and contracts for operations in which the Bureau cooperates and assist in the inspection of aircraft and the supervision of pilots engaged in such operations. The Center, located at Cimarron Field near Oklahoma City, will also cooperate closely with the CAA Aeronautical Center, located nearby, in the development of standards for the benefit of agricultural aircraft operators throughout the country. This will include participation in meetings, preparation of information for publication, and other activities of mutual concern.

"In the field of ground-application equipment the Equipment Management Center will assemble and maintain current information on the development and availability of pest-control machinery and advise Bureau field stations on suitable machines for their use, or assist them in the acquisition or modification of special machines where required. A close association with engineers in the United States Department of Agriculture and cooperating states will be maintained. Their advice and assistance will be requested when engineering problems arise in connection with our effort to improve the special machines required for Bureau work.

"The Equipment Management Center will currently review all Bureau-owned standard automotive vehicles and other major field and shop equipment, and analyze their uses, including space studies of Bureau-occupied structures, to determine how effectively they are utilized. It will make recommendations for the acquisition, maintenance, and disposition of such equipment and facilities toward the end that maximum utilization may be realized.

"In consideration of the facilities available at the Center, it is expected that supervisory employees of the Bureau will report equipment requirements to the Equipment Management Center before purchasing or modifying special field equipment. It is also expected that the Center will be notified before standard automotive equipment is purchased, transferred, or disposed of so that the needs of the Bureau as a whole can be considered.

"Mr. Kenneth Messenger has been placed in charge of this new activity. You are requested to give him every possible assistance and cooperation. "

Soon after the Center was established it was determined that records of automotive equipment and the analysis of its utilization were more properly functions of the Bureau's Administrative Services Division. Therefore the Center was relieved of those particular responsibilities and its name changed accordingly.

It will be noted that the bulk of the following report deals with aircraft. There are three reasons for this emphasis. First, a great deal of work was required to make aircraft which had been equipped for one particular operation sufficiently versatile to perform any type of Bureau work. Second, very little is known by the public about the agricultural uses of aircraft and interest in the subject is developing rapidly. Third, the commercial manufacture of new types of ground equipment has decreased requirements for the design and development of special machines. This trend will undoubtedly continue but as Bureau airplanes become better equipped for the work required of them, greater emphasis is being placed on the acquisition and dissemination of information on ground equipment and on the improvement of its utilization.

The selection of Oklahoma City as headquarters for the Aircraft and Special Equipment Center came about in the following way and for the following reasons. Initial contact was made with the Civil Aeronautics Administration in Washington. That organization suggested that we discuss the subject with John H. Burke, an Oklahoma City airport operator active in national affairs who happened to be in the CAA office at the time of this contact.

It was considered by the Bureau that a more or less central location within the United States with reasonably equitable climate would be most suitable geographically. Since Oklahoma City satisfied this requirement the subject was discussed with Mr. Burke. He in turn conferred with the Governor and City Council and received assurances of generous cooperation. Several airports in and near Oklahoma City were inspected. Of these, Cimarron Field, 20 miles northwest of the City, was considered the most suitable. The City thereupon offered the use of this field, including one hangar, shop space and offices, free of charge for the period extending from March 1951 to June 30, 1952, with the understanding that thereafter a reasonable rental charge would be made.

Assurances were also made that every possible effort would be made to provide more satisfactory facilities as soon as possible after the Center became established. Such improved facilities would consist largely of a site less remote from the metropolitan area with a hangar high enough to accommodate the C-47 airplanes. This effort has been made but so far without tangible results.

In spite of some deficiencies the present facilities have served satisfactorily during the first year and a half of operation. With respect to aviation, Oklahoma has a record of aggressiveness. It is the birthplace of the AG-1 airplane and the National Flying Farmers' Association. It has accorded us practical hospitality and local organizations such as the CAA Aeronautical Center and Tinker Air Force Base have given us valuable assistance, especially in times of control-season emergencies.

Personnel attached to the Center insofar as possible were transferred from other Bureau activities. Consideration was given to their fitness for the new assignments as well as their essentiality to the projects of their origin. The same thinking was applied to the transfer of shop equipment from various field shops to Oklahoma City. This made it unnecessary to draw heavily from outside sources for either personnel or shop equipment.

SECTION II

ORGANIZATION

Original Organization

The organization of the Aircraft and Special Equipment Center was approved by the Director of Personnel on April 18, 1951. It was comprised of two sections: (1) an Aircraft Section, and (2) a Special-Purpose Field Equipment Section.

Personnel that were to make up the organization were assigned in April of 1951 from several projects within the Bureau, but transfers were not accomplished in all cases until the completion of the control programs to which they had been previously assigned.

For the Aircraft Section, two pilots and one mechanic were transferred from Gypsy Moth Control. They arrived in Oklahoma City in August 1951. One of the pilots went on military furlough in June of 1951. A supervisory pilot to be in charge of the Aircraft Section was transferred from Grasshopper Control and arrived at Oklahoma City in August.

One mechanic was transferred from Grasshopper Control to the Special-Purpose Field Equipment Section. His arrival was delayed until August 1951. In November of 1951, a transfer was made from Gypsy Moth Control to fill the supervisory vacancy in that section.

Because of the considerable amount of work required to equip and modify aircraft for the 1952 season, one of the temporary pilots employed during 1951, who holds a mechanic's license, was retained as a mechanic. In February of 1952, he was reclassified as a pilot.

An additional A&E mechanic was employed on a full-time basis in January 1952.

On January 5, 1952, a transfer was made from White-Fringed Beetle Control in Macon, Georgia to fill the vacancy of Secretary. This position was vacated by resignation in September and was filled by promotion from the position of Clerk-Stenographer.

Revised Organization

During the operation of the Center from April 1951 until May 1952, it became apparent that there should be more flexibility between the Aircraft Section and the Special Equipment Section. The organization was therefore revised during May of 1952 to include an Operations Supervisor and a Planning or Programming Supervisor to function across-the-board rather than as supervisors of the two sections. This permitted both supervisors to maintain familiarity with all work of the Center and to substitute for one another during extended absences by either. See chart showing the revised organization.

Temporary Employees

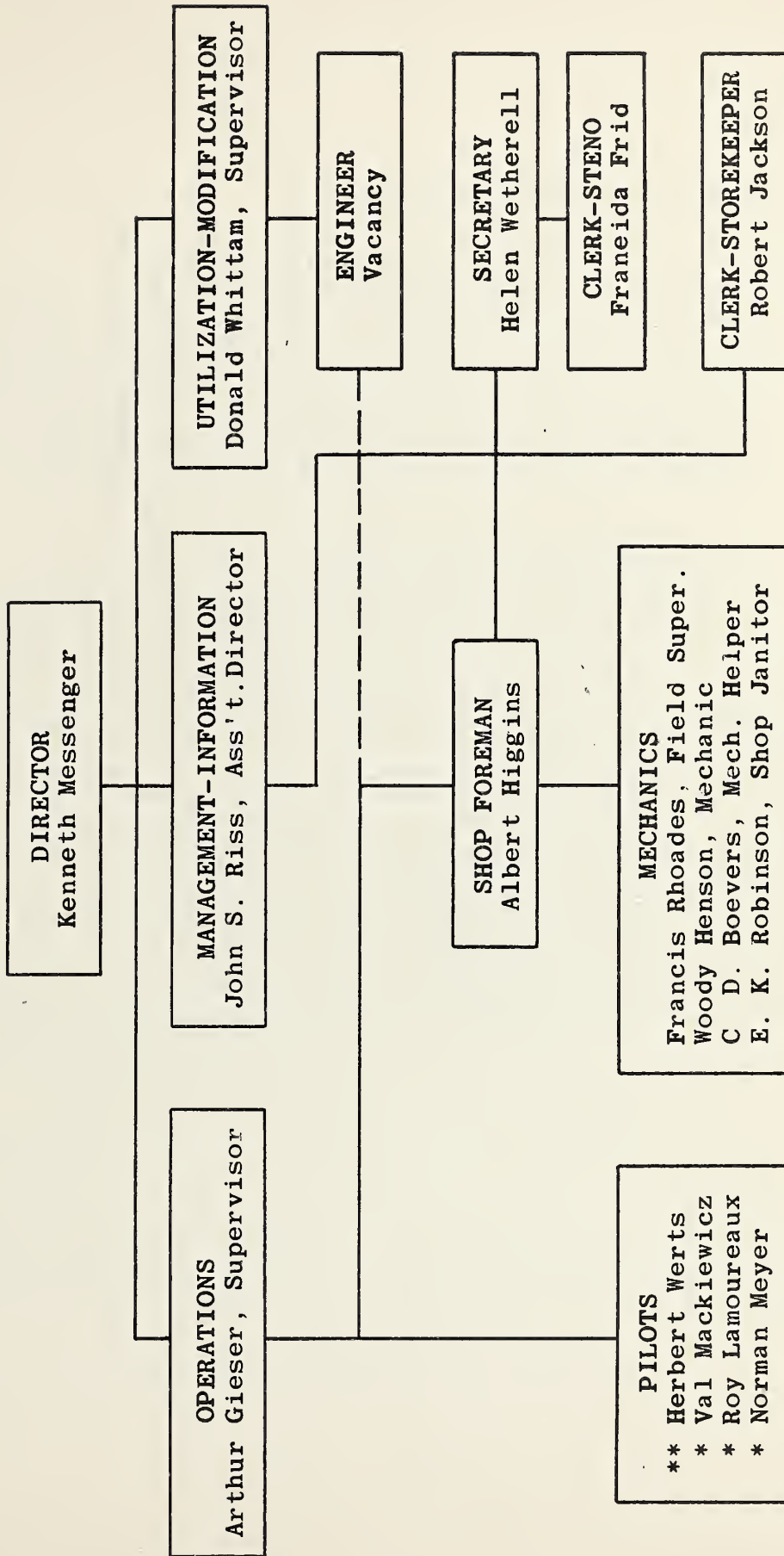
During 1951 temporary pilots, in most cases, were employed by the various projects as needed. The transfer of the planes and personnel from the several projects was not accomplished until the end of their control seasons in 1951 and it was more convenient for each project to take care of its own pilot needs until that time.

In 1952 all temporary pilots were employed by Region III. Considerable difficulty was encountered in locating qualified pilots. First pilots with the necessary qualifications to fly multi-engine aircraft were even more difficult to locate than pilots with qualifications to fly single-engine aircraft or act as co-pilot in the C-47s. In view of this it was deemed advisable to employ another pilot on a permanent basis. For this reason a temporary C-47 pilot who worked during 1951 and 1952 was retained at the close of the 1952 season. This provided a permanent first pilot for each of the C-47s.

Temporary stenographic and clerical assistance was required periodically. Remoteness of the office from the metropolitan area and the absence of public transportation made it difficult to acquire permanent office help. For that reason temporary assistance frequently was required.

ORGANIZATION CHART

AIRCRAFT & SPECIAL EQUIPMENT CENTER
Bureau of Entomology & Plant Quarantine
U. S. Department of Agriculture



* Alternates As Mechanic When Not Flying
** On Military Leave

Regional Liaison Assignments

In December 1952 an agreement was reached with the Director of Region II that anticipated the assignment of an equipment specialist of the White-Fringed Beetle Control Project to a liaison position in that Region. This agreement tentatively provided for the administrative direction of the appointee to remain within the Region and the technical direction to be assumed by the Aircraft and Special Equipment Center. The functions of this position were outlined as follows:

1. Appraise the use and performance of special Bureau-owned equipment.
2. Appraise commercial equipment and the degree to which it might perform work now accomplished by specially developed equipment.
3. Make recommendations for fuller utilization of equipment through temporary transfer between projects.
4. Participate in demonstrations and field tests and recommend improvement of equipment and application methods.
5. Attend occasional spray schools and other similar meetings to describe effective application equipment and methods.
6. Investigate items or details of equipment, upon specific request, to assist in making recommendations for the benefit of the Bureau as a whole.
7. Assist the Aircraft and Special Equipment Center by evaluating the need for special equipment that may be required to perform unusual functions.

If the potential benefits anticipated through this assignment are realized it was assumed that consideration would be given to similar assignments in other regions with possible adjustments in duties to adapt them to the particular requirements of each region.

SECTION III

COOPERATIVE ACTIVITIES

Technical assistance and equipment facilities of the Aircraft and Special Equipment Center are available to Bureau agencies and other Federal, State and cooperating interests in which aircraft and special-purpose field equipment are used for control, survey and research pertaining to the agricultural pests.

In order to acquaint all of the agencies in the Bureau with the services offered, a memorandum was distributed in August 1951 outlining these services. A request also was made for the agencies to list their past use of aircraft and special equipment and, as nearly as possible, to indicate their future requirements so that logical planning of our program might be accomplished. Excellent response was received in reply to the memorandum.

During the latter part of 1951 and early in 1952, several requests were received from Bureau agencies for information and assistance leading to the development or procurement of special machines to meet their needs. For the most part, the requests were for information on the availability, through industry, of such machines or on the possibility of having them developed by industry to satisfy particular requirements.

The interrelationship of functions during the formative months of both the Division of Administrative Services and the Center indicated some adjustments in procedure. At the end of the reporting period recommendations were being prepared for implementing these adjustments. In the meantime the Center reviewed Administrative Services prepurchase equipment specifications. It also studied the use of special-purpose Bureau field equipment in an effort to increase its usefulness through transfer or replacement.

It has been the policy of the Center in cooperating with other Bureau and Federal Agencies to make available for control and survey work, when possible, the required equipment and personnel. The requesting agency pays the per diem expenses of permanent personnel and operating cost of the equipment while away from Oklahoma City. Where seasonal personnel are hired specifically for a particular operation, both salaries and expenses are paid by the requesting agency. When equipment is used for research work, the Center delivers the equipment to and from destination at no cost to the requesting agency, but that agency defrays per diem and operation costs during the assignment.

Prior to actual control work performed by aircraft, assistance is given by the Center in preparing contracts for the various projects requiring contract work. An attempt has been made to draw up a contract suitable for all programs, with the understanding that minor changes would be made by agency officials as required. Final approval of the contracts in some instances involves meeting with the specific agencies to discuss special requirements not applicable to all programs. The contracts are then submitted to Washington for final approval and printing. Cooperative assistance in drawing up contracts has been given to Grasshopper Control, Gypsy Moth Control, White-Fringed Beetle Control and the U. S. Forest Service spruce budworm control program.

Technical supervision has been given to Bureau and other cooperating agencies where aerial spray applications for insect pest and plant disease control have been conducted. This supervision has been by pilot personnel experienced in aerial application work. On most assignments, a suitable airplane for such supervision has permitted the aerial observation of work being performed with contract aircraft and the covering of several operating bases within a control area during the same day. This supervision includes inspection of contract equipment prior to bid acceptance and also prior to work assignment to

determine if equipment meets the contract requirements. After bid acceptance, supervision includes the inspection of contracted equipment and personnel to ascertain that the contract requirements are complied with and that the performance of the contractor during the control operation is acceptable.

The following requests were received during 1951 and 1952 from agencies within the Bureau for information on the availability or the possible development of special machines for specific problems. A brief summary of the cooperative work is given together with a brief description of the special machines requested. A table listing the aircraft assignments semi-monthly with location and projects responsible for the operation is shown on page 12.

CONTROL ACTIVITIES

Barberry Eradication

A request was received during 1951 for information on an efficient compressed-air sprayer as replacement equipment on Barberry Control when present sprayers wear out. Literature of available pump and compressed-air sprayer equipment was assembled and discussed with project personnel. Although present compressed-air equipment operates satisfactorily, standard sprayer equipment will continue to be reviewed for future replacement needs.

Grasshopper and Mormon Cricket Control

During 1951 and 1952 four planes with pilots and mechanics were made available to the Grasshopper Control Project for use in the control of grasshoppers and Mormon crickets in the western states. A supervisory pilot was available when needed to inspect contract work on these programs. During 1952 a supervisory plane also was available to facilitate the inspections and technical direction.

AIRCRAFT ASSIGNMENTS DURING 1952

[illegible]

During 1952 a spray-boom-type sprayer was needed for use in grasshopper control demonstrations. The proposed sprayer installation was discussed with Grasshopper Control personnel. Recommendations were made for the use of a surplus insecticide-mixing tank and engine previously used by Grasshopper Control. Specifications were drawn up using this unit and a commercial spray-boom assembly unit mounted on a power wagon. Fabrication and installation of the spray unit was done by contract under supervision of the Aircraft and Special Equipment Center. The Grasshopper Control Project was supplied with information and specifications for the purchase of additional units.

Gypsy Moth Control

During 1951, one spray plane was assigned to Gypsy Moth Control. During 1952 an additional sprayer assisted in the control work during the last month of the program.

Prior to and during the 1952 gypsy moth control program, pilot supervisory personnel was furnished to inspect for approval the equipment and personnel offered by contractors prior to spraying and to assist in the direction of the program. Shortly after the work started, the factory delivered the Piper Super Cub airplane purchased by the Bureau. This was immediately put to use for supervisory observation and direction, replacing an airplane previously rented for that purpose.

Pink Bollworm Control

A request was received in October 1951 for a machine for destroying pink bollworm larvae in cotton bolls. Literature relative to commercial stalk-shredding equipment was assembled and reviewed with requesting project personnel. In cooperation with the pink bollworm personnel and a BPISAE engineer this problem was discussed with officials

of the Wetmore Company at Tonkawa, Oklahoma who, at their own expense, developed and experimented with a machine that incorporated one of their hammer-mills.

Spruce Budworm Control

At the request of the U. S. Forest Service, technical supervision was given prior to and during the 1951 and 1952 spruce budworm control programs conducted in the Northwest. During the 1951 program, an airplane was rented by the Forest Service for supervisory use, but during the 1952 program one of the Bureau's observation airplanes was used for that purpose. The Forest Service has praised this assistance highly and given it major credit for greatly reducing pilot fatalities in 1951 and eliminating them in 1952.

White-Fringed Beetle Control

Standard equipment of the mist-blower type may be needed for replacement of the present waggle-tail blowers when they wear out. A file is being maintained on the latest mist-blower equipment available on the open market and selection and recommendation of suitable units will be made when present machines require replacement.

Blister Rust Control

On the dirt roads of the Sierra Nevadas, dust enters the cabs of pick-up trucks and carryalls during the summer months, creating a health hazard to field personnel. This problem was discussed with several air-filter, air-blower and truck manufacturers. No adaptable unit was found to be available. Engineering and development costs appear to be prohibitive. The market is being watched for a unit which may solve the problem.

EXPERIMENTAL ACTIVITIES

Cereal and Forage Insect Investigations

A boom-type sprayer was needed in the spring of 1952 for experimental work on small-grain insects and mites. Arrangements were made for the loan of a jeep-mounted mist-blower from the White-Fringed Beetle Project. A commercial spray-boom assembly was purchased and mounted on the jeep and the mist-blower unit altered to meet the special requirements of the new work. The equipment was tested and calibrated prior to being turned over to the research station at Garden City, Kansas.

A request was received late in 1951 for a compact knap-sack sprayer for experimental work on corn earworm control in Illinois. Literature of several manufacturers of knap-sack sprayers was assembled and reviewed. Recommendations of equipment most suited to their needs were made to project personnel.

A request was received in September 1951 for a machine to control soil pests in sugar cane stubble. The available soil-treating and fumigating equipment was reviewed and discussed with several mechanical engineers. Considerable thought was given to the requirements of a suitable machine but further consideration was held up pending successful control of the insect pests by hand-placed insecticides.

In 1951, an airplane and pilot were made available for experimental spray applications for European corn borer control conducted by the European Corn Borer Research Laboratory at Ankeny, Iowa.

During 1951 and 1952, an airplane and pilot were made available on two occasions to make a series of spray applications of new insecticides for the control of grasshoppers. These were conducted by personnel from the Bozeman Laboratory.

Blister Rust Control Experiments

A power sprayer was needed that could be easily transported into remote forest areas for ribes spraying in California. For easy portability, it was desirable that the sprayer be in two parts. Literature was assembled on small portable units of equipment available on the open market. This was discussed with personnel from the requesting agency, but it was found that no commercial unit fully met requirements. A unit then developed by Blister Rust Control personnel in cooperation with the U. S. Forest Service appeared to have promise.

A pilot, with airplane equipped to distribute either dry materials or spray, was made available for experimental work on ribes control in 1952. Calibration of the equipment was accomplished in Oklahoma City by personnel from the Aircraft and Special Equipment Center, the White Pine Blister Rust Control office at Berkeley, California, the Experiment Station at Guthrie, Oklahoma and the American Paint and Chemical Company in Pennsylvania. After the airplane was calibrated, applications were made on a brushy area at the Experiment Station near Guthrie, Oklahoma with the Soil Conservation Service cooperating.

Actual ribes-control test applications were made from July 11 through July 19 near Sonora, California. Several experimental plots were treated with granulated 2, 4-D and several with liquid 2, 4-D. The work was done under the direction of personnel of the White Pine Blister Rust Control Development and Improvement Project and the White Pine Blister Rust Control Project.

Following the completion of the 1952 spruce budworm spraying program, the pilot-supervisor with one of the Bureau's observation aircraft assisted with the ribes control experiments.

White-Fringed Beetle Control Experiments

At the request of the White-Fringed Beetle Project, an airplane equipped to distribute dry materials was ferried to Macon, Georgia by one of the Center's pilots to assist in aerial application experiments. Applications of granulated clay, impregnated with DDT or Dieldren, were made to brushy and woodland areas for white-fringed beetle control tests. The tests were conducted cooperatively by State, county and Bureau agencies. Application rates varied from 17 to 170 pounds per acre.

Screwworm Control Experiments

At the request of the Division of Insects Affecting Man and Animals, the Piper Super Cub airplane and one of the Center's pilots was made available to assist in the experimental screwworm "fly-drop" being conducted by personnel of the Orlando, Florida laboratory. Installation of a mechanical unit for regulated releases of screwworm pupae was made by engineering personnel at Orlando. The experiment involved the periodic release of radio-active screwworm pupae and flies over approximately 1200 square miles along the central east coast of Florida.

SURVEY ACTIVITIES

The airplane is becoming an almost indispensable instrument for the survey of forested areas. Toward the practical recognition of this fact the Center is realigning its aircraft inventory and pilot-training program to increase its usefulness in that field. Following are surveys in which the Center participated during the reporting period. Greater activity along this line is expected in 1953.

During July 1951 and July 1952 a supervisory pilot was made available for the defoliation survey of gypsy moths. For the 1952 survey a scouting plane was also provided.

One of the Center's permanent pilots assisted the Division of Forest Insect Investigations in a blowdown-bark-beetle survey in Oregon in June and July 1952. He acted in a supervisory capacity and also piloted one of the Cessna 170B airplanes leased for the work.

An observation airplane with pilot was assigned to the Division of Forest Insect Investigations in New Mexico and Arizona for an aerial reconnaissance survey in October 1952.

SECTION IV

EDUCATIONAL AND INFORMATIONAL SERVICES

Service facilities of the Aircraft and Special Equipment Center in connection with the dissemination of information have become a major function. They are made available to Bureau agencies and other Federal, State and cooperating interests in which aircraft and special-purpose field equipment is used for control, survey and research.

In addition, and more time-consuming, is the work required to answer a wide variety of specialized inquiries from the general public and from foreign interests. A considerable number of these have involved direct replies to letters addressed to the Chief of the Bureau or the Secretary of Agriculture.

Other activities in this field include attendance at pest control schools and conferences, the issuance of publications both by the Center and in cooperation with other agencies, the demonstration of Bureau equipment at pest control schools and on other special occasions, and the assembling of bulletins, catalogs, and literature on aircraft and special equipment for dissemination to other Bureau agencies and cooperators.

At the request of the sponsors, personnel of the Aircraft and Special Equipment Center have attended pest control schools and conferences. In most cases they were asked to actively participate in the programs and discussions. Such meetings are usually sponsored by state agricultural colleges or other organizations such as the National Flying Farmers' Association or aerial applicator organizations. A brief summary of the more important schools and conferences attended is included in this report.

At the request of the American Chemical Society, a talk on the subject "Development of Aircraft for the Application of Pesticides" was delivered before the Division of Agricultural and Food Chemistry at the World Chemical Conclave in New York City, September 7, 1951. It is understood that this talk will be published by the American Chemical Society in the "Advances in Chemistry Series."

An invitation to speak at the 1951 National Conference on Airport Management and Operations at the University of Oklahoma at Norman, Oklahoma October 11 and 12 was accepted. The functions of the Aircraft and Special Equipment Center were described and remarks made in conjunction with that part of the program entitled "You Can't Fight a War on an Empty Belly."

The Third Annual Aerial Dusting and Spraying Conference at Yakima, Washington was attended in November 1951. A brief talk, setting forth the organization and function of the Aircraft and Special Equipment Center, was given.

Following the Yakima meeting, and by request, the annual meeting of the California Agricultural Aircraft Association, Inc. at Las Vegas, Nevada was attended.

A talk covering the use of aircraft in agriculture and experiences of the agricultural pilot was made before students of the John Marshall High School in Oklahoma City during November 1951 by one of the Center's pilots.

Two members of the Center attended the National Cotton Mechanization Conference at Chickasha, Oklahoma in November 1951.

The Eighth Annual North Central Weed Conference was held in Oklahoma City during December 1951. The Center participated in the aerial application section of the program with a talk on the development of dispersal apparatus for aircraft.

During the time of this meeting, the Center was also represented at the American Association of Economic Entomologists annual meeting in Cincinnati, Ohio.

A meeting of the Pesticide and Application Equipment Committee at Buffalo, New York was attended December 6 and 7, 1951.

At the Custom Spray Operator's Short Course at Lincoln, Nebraska, February 7-8-9, 1952, two talks were presented by personnel of the Center. They were entitled "The Use of Aircraft in the Control of Agricultural Pests" and "Common Faults in Spray Apparatus Installed in Aircraft."

A meeting of the southwest branch of the AAEE was attended by a representative of the Center February 27-29, 1952 at Kerrville and San Antonio, Texas.

Two of the Center's personnel attended the First Texas Agricultural Aviation Conference at College Station, March 31 and April 1, 1952.

The Center was represented on the Steering Committee that planned the National Agricultural Aviation Conference held at Denver, Colorado, March 23 and 25, 1952. The Conference was attended by three representatives of the Center. Participation by two of those attending included the presentation of a paper on Spruce Budworm Control, written by the Forest Service, and a talk entitled "Functions of the Aircraft and Special Equipment Center and Some of the Factors That Influence Aircraft Spray Patterns." It was on the return trip to Oklahoma City following this meeting that the airliner on which the three Center personnel were passengers, caught fire in the air and made a fortunate landing in a Kansas wheat field.

Personnel of the Center were not available to participate in the South Dakota Spray School in Rapid City April 19, 1952 because of other commitments. However, through the

cooperation of the Grasshopper Control Project, arrangements were made for an Area Grasshopper Control Supervisor to visit the Center to assemble information in preparation for his participation in the meeting.

The General Services Administration Equipment Maintenance Meeting in Denver, Colorado was attended May 15-16, 1952.

On May 23, 1952, the Center was host to a group of representatives from Western Europe touring the United States on an Agricultural Aviation Mutual Security Agency project. In cooperation with the State Aviation Commission, the CAA and the Aerial Applicators Association, a program including talks by representatives of each agency and the showing and demonstration of the Center's equipment resulted in considerable interest and the asking of numerous questions. All members of the group were guests of the Oklahoma City Chamber of Commerce at a Forum Luncheon.

The National Flying Farmers' Association invited the Center's director to be a guest at its Annual Convention in 1952 at Auburn, Alabama but justification for the trip's cost appeared questionable and the invitation was declined.

The Arkansas State Plant Board, in connection with drawing up regulations for the aerial application of 2, 4-D, was supplied with information on methods of minimizing drift and dribble.

The Pacific Branch meeting of the American Association of Economic Entomologists at Santa Barbara, California was attended June 24-26, 1952.

The Fourth Annual Aerial Dusting and Spraying Conference at Yakima, Washington was attended October 20-21, 1952.

A meeting of the Pesticide and Application Committee at Buffalo, New York was attended December 1 and 2, 1952.

The Sixth Annual Cotton Insect Control Conference at Memphis, Tennessee was attended December 9-10-11, 1952.

To help meet a pressing and increasing demand by farmers and pest control interests for general information on aircraft spraying, the Center, during the summer of 1952, recommended that the Bureau of Entomology and Plant Quarantine enter into a contract with the University of Oklahoma Research Institute. The contract provided for the University of Oklahoma to rewrite and arrange material supplied to them by the Aircraft and Special Equipment Center for a manuscript entitled "How to Spray the Aircraft Way--for Agricultural Pest Control. "

The contract was signed and several preliminary conferences held in the fall of 1952 to organize material for the bulletin. The first draft was completed by the end of the year.

The University's concern in the bulletin stemmed from its interest in presenting technical information to readers of a specific intelligence level in a form that they would find readable and understandable. Whether that goal will be achieved in this instance remains to be seen, but preliminary results are encouraging.

A manuscript describing the baiting and spraying apparatus installed in the Bureau's Douglas C-47 airplane was prepared for publication and submitted to the Bureau in September 1952.

At the request of the Washington office of the Civil Aeronautics Administration, the Center was requested to review and advise on a publication being prepared by them entitled "Aircraft at Work". The publication was a resume of information obtained through a nation-wide survey of the industrial uses of aircraft.

Information on spraying and dusting by aircraft was given to a free-lance writer commissioned to prepare an article for FLYING magazine on the Center's work. In September 1952 he spent two days reviewing equipment and gathering information.

Several manuscripts on equipment subjects were referred by the Bureau editorial office to the Center for review prior to their publication.

Six feature articles describing the work of the Center appeared from time to time in Oklahoma newspapers.

The Center's director was appointed to the Aviation Committee of the Oklahoma City Chamber of Commerce and to a special Mayor's committee which made recommendations on the future course of the local aviation industry.

The following demonstrations of Bureau aircraft and methods of insect control were made with aircraft based at Oklahoma City during the reporting period.

As a part of the Bureau's participation in the 1952 Aerial Dusting and Spraying Conference at Yakima, Washington, the high-lift-wing Stearman was demonstrated. It was the feature attraction at the meeting where qualified pilot-operators were permitted to fly it. After the Yakima meeting, it was also displayed and demonstrated at a Field Day in Hillsboro, Oregon.

During the 1952 Gypsy Moth control work Douglas airplane #2 was demonstrated at Glens Falls, New York to a small group of men representing several countries in Europe and South America.

Between control assignments, Douglas airplane #1, equipped as a baiter, was demonstrated to the Western European group who visited the Center at Cimarron Field May 23, 1952. Sawdust was released to simulate the distribution of poison bait as used on Mormon cricket control. Following this demonstration, the airplane was opened for inspection by the group.

During the week of August 17, 1952, Douglas airplane #1 and one small spray plane were demonstrated before a world-wide group at the National Grasslands Congress at State College, Pennsylvania.

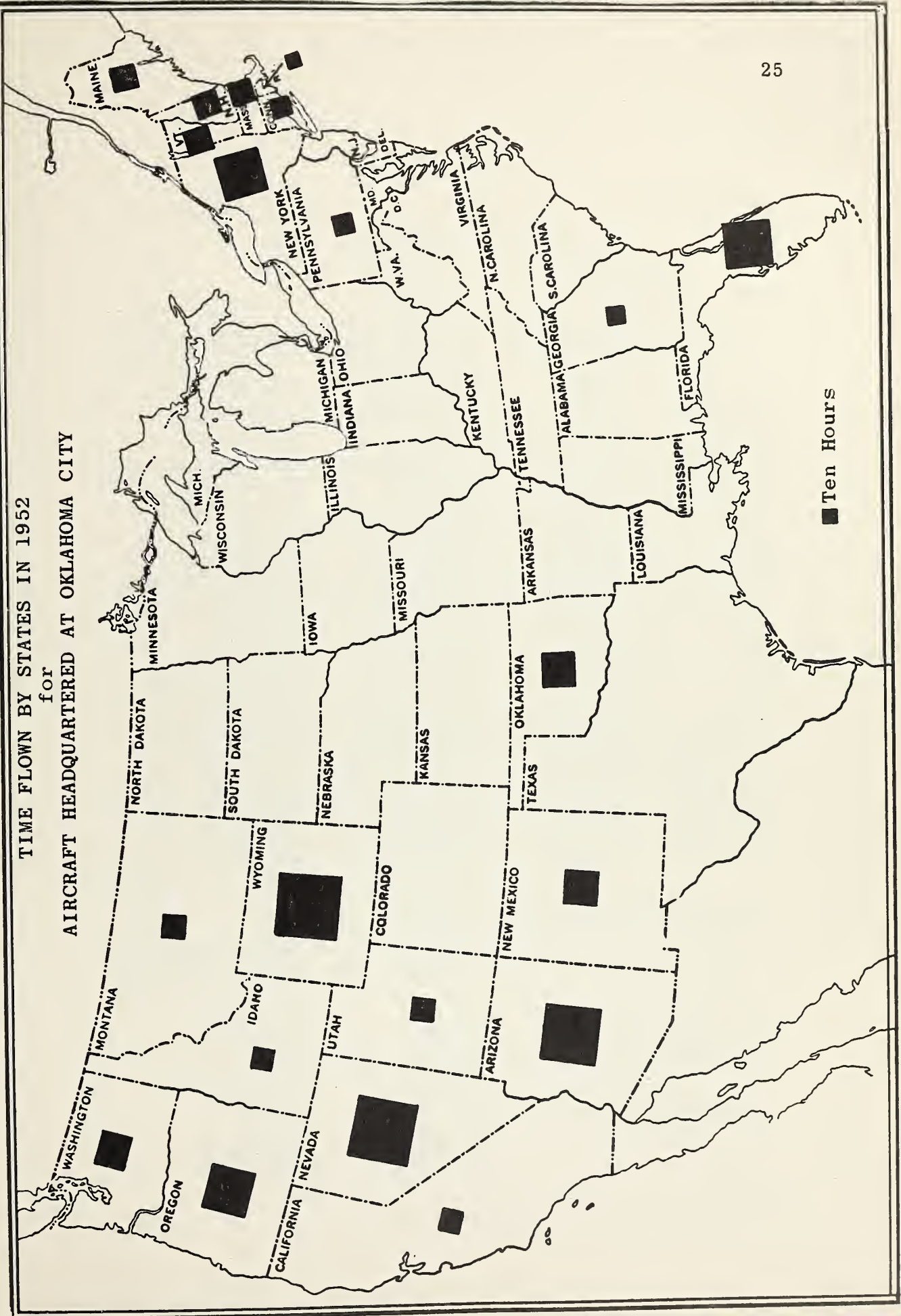
The Stearman high-lift-wing airplane was demonstrated on several different occasions at meetings in Oklahoma during the summer of 1952.

A service the Center offers to other Bureau agencies is assistance in providing or procuring information on manufactured products and materials. In this connection a file of bulletins, catalogs and literature is being assembled. The file includes items which may have application or be of interest to Bureau people having use for aircraft or special-purpose field equipment and accessories. When answers to requests for information of this sort cannot be found in the files, inquiry is made of commercial firms to compile a reference on the subject.

At the request of the Division of Stored Product Insect Investigations, the Center prepared two reference lists, one on sources of fumigation equipment and one on gas-tight tarpaulin material suitable for fumigation work. Four sets of each list were made up in brochure form with samples of tarpaulin material offered by each source listed. The brochures were of a convenient size for field use.

Of the persons who visited the Center during the reporting period, approximately 30 percent were Bureau people or those affiliated with other Bureaus of the U. S. Department of Agriculture or with the Civil Aeronautics Administration. The remainder represented aerial spray operators, state agricultural departments and foreign countries interested in methods of insect pest control in the United States.

TIME FLOWN BY STATES IN 1952
for
AIRCRAFT HEADQUARTERED AT OKLAHOMA CITY



SECTION V

VEHICLE INVENTORYAircraft On Hand December 31, 1951

<u>Type</u>	<u>CAA Number</u>	<u>Location 1951</u>	<u>Previous Location</u>
Douglas	N75029	Okla. City	Denver
Douglas*	N816	Okla. City	Greenfield
Douglas*	N819	Greenfield	Greenfield
Cessna 195	N9354A	Beltsville	Beltsville
Cessna 195	N9667A	Portland	Portland
N3N	N40036	Forest Grove	Forest Grove
N3N	N44827	Greenfield	Greenfield
N3N	N44860	Greenfield	Greenfield
N3N	N44868	Greenfield	Greenfield
N3N	N44875	Okla. City	Greenfield
N3N	N45009	Okla. City	Denver
N3N	N45055	Greenfield	Greenfield
N3N	N45254	Okla. City	Greenfield
N3N	N45266	Okla. City	Greenfield
Rearwin	N25431	Greenfield	Greenfield
Stearman	N1218V	Forest Grove	Forest Grove
Stearman	N1380V	Okla. City	Beltsville
Stearman	N9487H	Beltsville	Beltsville
Stearman	N9488H	Beltsville	Beltsville
Stearman	N55692	Okla. City	Greenfield

Other Vehicles On Hand December 31, 1951

<u>Type</u>	<u>Number</u>	<u>Transferred From:</u>
Ford Sedan '50	A41771	Harlingen
Ford Pickup '50	A35257	Hicksville
Internat'l 2T Truck '50	A36721	Denver
Internat'l 2T Truck '50	A36722	Denver
Internat'l 2T Truck '50	A36723	Denver
Fork Lift	10353634	Denver
Tractor	A3359	Greenfield

*On lease from the Navy Department

Purchases - 1952

<u>Type</u>	<u>Number</u>	<u>Location</u>
Cessna 170B <u>1/</u>	N2234D	Okla. City
Cessna 170B <u>2/</u>	N2494D	Portland
Super Cub <u>1/</u>	N1908A	Okla. City
Ford Sedan '52	A44404	Okla. City

Transfers - 1952

<u>Type</u>	<u>Number</u>	<u>To</u>	<u>From</u>
Stearman	N1218V	Okla. City	Forest Grove
Internat'l 2T Truck '50	A36721	San Antonio	Okla. City
Internat'l 2T Truck '50	A3672 2	Denver	Okla. City

Disposals 1951-1952

<u>Type</u>	<u>Number</u>	<u>Location</u>	<u>Disposition</u>
Douglas	N819	Greenfield	Turned back to Navy
N3N	N44827	Greenfield	Sold
N3N	N44860	Greenfield	Demolished in windstorm
N3N	N44868	Greenfield	Sold
N3N	N44875	Okla. City	Sold
N3N	N45055	Greenfield	Sold as parts
N3N	N45254	Okla. City	Sold
Rearwin	N25431	Greenfield	Sold
Cessna	N9367A	Portland	Used for trade-in

1/ Funds received from sale of aircraft 44827, 44868, 44875, 45055, 45254 and 25431 were applied toward purchase.

2/ Damaged airplane 9367A turned in on purchase.

On Hand December 31, 1952

<u>Type</u>	<u>Reg. No.</u>	<u>BEPQ No.</u>	<u>Location</u>
Douglas	N75029	1	Okla. City
Douglas*	N816	2	Okla. City
Cessna 170B	N2234D	3	Okla. City
Cessna 195	N9354D	4	Beltsville
Cessna 170B	N2494D	5	Portland
Stearman	N55692	6	Okla. City
Stearman	N1380V	7	Okla. City
Stearman	N9487H	8	Beltsville
Stearman	N9488H	9	Beltsville
Stearman	N1218V	10	Okla. City
N3N	N45009	11	Okla. City
N3N	N45226	12	Okla. City
N3N	N45036	13	Forest Grove
N3N	N1908A	14	Okla. City
Ford Sedan '50	A41771		Okla. City
Ford Sedan '52	A44404		Okla. City
Ford Pickup '50	A35357		Okla. City
Internat'l 2T Truck '50	A36723		Okla. City
Towmotor Fork Lift	10353634		Okla. City
Farmall Tractor	A3359		Okla. City

*On lease from the Navy Department.

SECTION VI

AIRCRAFT MAINTENANCE AND MODIFICATION

It was not until the pilots and mechanics arrived in Oklahoma City in August, 1951, after the completion of their field assignments, that it was possible to set up the shop at Cimarron Field near Yukon, Oklahoma.

Shop equipment was transferred from the several shops within the Bureau that were being closed or reduced. Surplus equipment available from the Air Force at Dayton, Ohio and Marietta, Georgia also was selected and transferred.

The major items of shop equipment being utilized through transfer was received from the following agencies:

- Golden Nematode Control
- Grasshopper Control
- Gypsy Moth Control
- White-Fringed Beetle Control
- U. S. Air Force.

In addition to the transfer of equipment it was necessary to purchase several items for the shop including sheet metal machine tools which were not available through transfer. By the spring of 1952, the shop was reasonably well equipped to carry out required maintenance and modification work.

All machinery was repainted to colors specifically established by safety codes to provide better visibility and to make employees using the machines aware of the danger zones.

At the close of each season's work program it is necessary to inspect and check field equipment, make repairs where needed and ready it for the next year's programs. For this reason the off-season time of pilots was fully utilized in the shop where they functioned as mechanics. Their usefulness in the shop was enhanced through their observance of the operation of equipment in the field and their consequent knowledge of modifications that could be made to improve its performance.

Plans were made early in 1952 to install radios in all planes. This was considered desirable both from a standpoint of safety in ferrying the planes and in ground-to-air communication during control and experimental operations. It is expected that all the planes will have radios in 1953. A ground receiver to carry on two-way communication with the aircraft also was purchased to improve the various program operations.

The Center has been fortunate in being located near the CAA's Aeronautical Center and Tinker Air Force Base. Both activities have been most cooperative in the loan and transfer of important equipment items. Items such as meters and pumps have been borrowed from the Air Force. Engines, propellers, tires, landing wheels, carburetors, shock struts, ailerons, elevators and a number of other items have been borrowed from the CAA. If it had not been possible to borrow some of these things, serious delays would have occurred while waiting for deliveries of open market purchases.

Engines, propellers, carburetors, generators, shock struts, and all accessories are overhauled by authorized repair stations. The installation of them is performed by the Center's personnel.

A brief summary describing the major accomplishments on aircraft and ground equipment during 1951 and 1952 follows:

AIRCRAFT

BEPQ-1 (Douglas C-47)

Prior to 1951, this airplane was used for dispersing only dry bait materials on Grasshopper and Mormon Cricket Control programs. After the control season in 1950, it was decided to so adapt the airplane that it could be used also as a sprayer. Construction of the spray system was completed in March, just prior to the 1951 control season and the plane was flown to Beltsville, Maryland for spray-pattern and swath checks. In conformance with the Bureau's design,

the spraying system was installed by the U. S. Naval Air Station at Corpus Christi, Texas. The airplane was ferried to Oklahoma City at the close of the 1951 field assignment and given a thorough inspection. With some minor modifications it was made ready for the next season.

In converting the plane to a sprayer, six special 170 gallon insecticide tanks were cradled in the bait hopper, three on each side. Tubing inside the wings carried the insecticide to four large nozzles suspended from the wings, behind each engine nacelle and eight feet inboard from each wing-tip.

Prior to the 1952 season the four nozzles were removed and two booms, each containing eight nozzles, were suspended from the wing behind each engine nacelle. This arrangement produced a more uniform swath than the one used in 1951.

Because of the complex character of some of the proposed modifications that were considered desirable prior to the 1953 season, it was felt important to have engineering assistance. Therefore, upon request, the Forest Insect Investigations Laboratory at Beltsville made the services of Engineer David Isler available for one week during September 1952. The Bureau of Plant Industry, Soils and Agricultural Engineering assumed his travel expense.

The insecticide pumping system was modified as follows. For improved safety and efficiency the regular aircraft hydraulic system, which had previously been used to operate the spray system, was restored to its original form. Two additional complete hydraulic systems were installed, each driving its own spray pump. Interconnections permit uninterrupted spraying should one hydraulic system or one pump fail.

The latter part of the 1952 season, this airplane sprayed in mountainous terrain. While flown at a climbing attitude in emptying the last part of the load, it was found that the insecticide tanks did not empty completely because the tanks had outlets in their forward ends only. Even though

the tank bottoms were constructed with a forward pitch almost 200 gallons sometimes remained in them. Therefore, in the fall of 1952, the tanks were modified to provide an additional outlet at the rear of each tank. The tanks now empty completely regardless of the airplane's attitude.

As an added safety feature two hydraulically-operated emergency dump valves were installed. The four 2-inch manifolds that previously connected the six tanks were replaced with two 5-inch manifolds to provide the flow-rate required. The tank venting system was enlarged so that dumping would not be restricted. This dumping system permits the usual load of approximately 800 gallons of insecticide to be dumped in one minute.

The loading system was modified so that the insecticide could be loaded without opening the doors or climbing on the wings and so that spillage could be kept out of the fuselage. The two tank inlets were extended out through the airplane's skin on the lower left side of the fuselage behind the wing and fitted with 2-inch quick-disconnect couplings.

During the last spraying assignment of the 1952 season, the right wing-tip was damaged when it struck a low bushy tree on take-off from an emergency airstrip. The right elevator was damaged by cattle that strayed into the parking area at night. This damage was not sufficient to prevent safe flight of the airplane and was repaired by a contract repair facility after the plane returned to Oklahoma City.

Both engines, after three seasons of operation, were replaced. Flight instruments were removed and overhauled. The left main fuel tank was removed and repaired to stop leakage.

Controls for the windshield-washing system and wipers were relocated in a convenient position so that they could be operated by either the pilot or co-pilot. Prior to this, they could be operated only by the often-fully-occupied pilot.

In the spring of 1952, the plane was licensed under CAA's Manual 08, restricted category.

BEPQ-2 (Douglas C-47)

This airplane arrived in Oklahoma City in August following the 1951 spray season and was given a thorough inspection. The following work was done on it:

The right engine was replaced with one that had been major-overhauled.

To improve the take-off, the toothpick-type propellers were replaced with a paddle-blade type. (These were obtained in an even exchange with the CAA Aeronautical Center.)

The windshield-washing and wiper controls were relocated as in BEPQ-1.

The plane was relicensed under CAA's Manual 08, restricted category.

BEPQ-3 (Cessna 170B)

An airplane was needed for survey work and for supervising contract aircraft. So that it could be used to perform the greatest variety of such work it needed to meet as many of the following specifications as possible: (1) carry at least four people (one pilot and three observers); (2) have ample cabin room so that observers would not be crowded; (3) carry a minimum of four hours fuel supply; (4) be a high-wing monoplane so that observers' visibility downward would not be impaired; (5) be well ventilated for low flights in summer heat; (6) have good visibility in all directions; (7) have good controllability and safe maneuverability, while fully loaded, at a minimum speed of 60 mph; (8) have sufficient power to work at altitudes up to 12,000 feet; (9) be able to take off and land in short, rough fields; (10) cruise at 150 mph to keep ferry time between base of operations and worksites to a minimum and to check fast

contract aircraft; (11) be of all-metal construction so that it would readily withstand long periods of exposure to the weather and, if possible; (12) be adaptable for conversion to a sprayer.

Invitations to bid were issued to manufacturers and a Cessna 170B was purchased in April 1952. This plane satisfied the major requirements.

BEPQ-4 (Cessna 195)

Assigned to the Division of Forest Insect Investigations, Beltsville, Maryland.

BEPQ-5 (Cessna 170B)

Assigned to the Division of Forest Insect Investigations, Portland, Oregon.

BEPQ-6 (Stearman)

This airplane was ferried to Oklahoma City in August, 1951, following the spraying season. Its fabric was six years old, had suffered from exposure and needed to be replaced. Much of the woodwork in the wings, especially in the ribs, was in poor condition, suffering from dry rot, exposure to moisture and glue separation. The pumping system left much to be desired.

A high-volume centrifugal pump was installed. An aluminum boom, made up of four 6-foot sections to which a variety of nozzles can be attached, was installed underneath the fuselage and lower wings. Provision was made for twelve 1/2-inch outlets and twenty 3/8-inch outlets. The boom is arranged so that a short, medium-length or long boom set-up can be employed as may be desired for various spray jobs.

A 5-inch dump valve capable of emptying 150 gallons in approximately fifteen seconds was installed for emergency use.

A hydraulic system replaces the wooden propeller formerly used to drive the spray pump.

The fuselage was covered with aluminum sheet metal. Large removable panels were installed on the left side, the full length of the fuselage. A VHF radio transmitter and receiver and a low frequency receiver were installed.

A streamlined headrest was installed behind the pilot's seat.

The tail surfaces were recovered with new fabric, doped and painted.

The fabric on the wings from BEPQ-7 was rejuvenated, doped and repainted. The wings were then installed on this airplane.

BEPQ-7 (Stearman)

This airplane, equipped with a 225 hp Lycoming engine, was transferred from the Forest Insect Investigations Laboratory at Beltsville, Maryland to Oklahoma City in the fall of 1951. It was in excellent condition but was not equipped with spray or dust apparatus.

The wings from BEPQ-6 that were to be installed on this airplane needed to be completely rebuilt.

After several conferences with CAA engineers from the Fort Worth Regional office, it was decided to build new ribs for these wings to produce a high-lift airfoil. It was hoped that this airfoil would have the following advantages: eliminate the critical stall-characteristics that often cause serious accidents during steep turns or abrupt pull-ups; improve slow-flight characteristics; enable the airplane to carry a capacity load with less horsepower; and make it safer and more maneuverable.

There was exceptional interest shown in this modification on the part of private operators and others interested in the possibility of improving Stearman aircraft used for agricultural work. The following cooperators contributed toward the rebuilding of the wings:

The CAA Aeronautical Center provided two A&E mechanics for a six-weeks period.

The CAA Regional Office, Fort Worth, Texas sent engineers to visit the shops on several occasions to offer technical assistance and advice.

John H. Burke, President of the Aerial Applicators Association, donated the required aircraft spruce and some of the labor for covering the wings.

Two instructors in Agricultural Engineering at Oklahoma A&M College took photographs and prepared drawings and blueprints.

The following dispersal apparatus was installed:

- A 130-gallon spray tank
- A 5-inch dump valve for emergency use
- A 2-inch centrifugal pump
- A hydraulic drive-system similar to BEPQ-6.

Following the initial flight tests, a short 1 1/2-inch diameter spray-boom slightly longer than half the wing span was suspended from the fuselage and lower wings.

The CAA flight-test engineers flew a number of evaluation tests but were not favorably impressed by the performance of the plane with a 225 hp engine. The additional drag created by the increased camber and wing area was apparently greater than the added lift obtained. Slow-flight and stall characteristics, however, were improved considerably.

In August 1952, a 300 hp Lycoming engine, together with a constant-speed controllable-pitch propeller, was installed to test the high-lift-wing performance. The additional horsepower (over the 225 engine) and the new propeller greatly improved the take-off and climb performance.

In November 1952, the CAA Regional Office at Fort Worth assigned a flight-test engineer to Oklahoma City to remain until all flight tests were completed. Alternating tests were flown with the high-lift wings and a set of standard wings, using 225, 300 and 450 hp engines. The tests included maximum climb-and-stall speeds at gross weights for comparison of the two types of wings and the three types of engines.

These tests confirmed the previous indications that the 225 hp engine did not give satisfactory performance. The airplane performed quite well with the 300 hp engine, but it was found that an undesirable longitudinal instability existed.

The final decision on the part of the flight engineers was that more redesigning work would be necessary before it could be unqualifiedly recommended. The project, however, was amply justified for it revealed a potential that encouraged several commercial organizations to design and merchandise new wings of similar configuration.

BEPQ-8 (Stearman)

Assigned to the Division of Forest Insect Investigations, Beltsville, Maryland.

BEPQ-9 (Stearman)

Assigned to the Division of Forest Insect Investigations, Beltsville, Maryland.

BEPQ-10 (Stearman)

This airplane was transferred to Oklahoma City in August 1952 from Forest Grove, Oregon where it had been used by the Division of Truck Crop and Garden Insect Investigations. It had previously been used on experimental work and was equipped with a very small insecticide tank.

A design for a combination spray-dust dispersal unit for this airplane was initiated.

The airplane was dismantled and started through the shop late in 1952 for all necessary heavy maintenance on the airframe and engine. It will not be completed for use during 1953.

BEPQ-11 (N3N)

This airplane is equipped to handle either liquid or dry materials. It was ferried to Oklahoma City after the 1951 control season was completed.

It was not necessary to make any repairs or modifications in the plane's dispersal apparatus to ready it for the 1952 season.

During 1951 the fabric suffered severe hail damage while on a grasshopper control assignment at Lusk, Wyoming. More than two weeks were required in patching all the holes to prepare the airplane for use in 1952.

BEPQ-12 (N3N)

This airplane was ferried to Oklahoma City in the fall of 1951. The airplane was equipped with a 90 gallon insecticide tank and a 6-nozzle spray system. It was in excellent condition and required only a thorough inspection to ready it for the 1952 season.

During the season a temporary pilot had the misfortune of flying through power lines at two different times. Little harm was done to the airplane in the first accident, but after the second, it was necessary to replace several square yards of fabric before it could be flown to Oklahoma City for additional repairs.

BEPQ-13 (N3N)

Assigned to the Division of Truck Crop and Garden Insect Investigations, Forest Grove, Oregon.

BEPQ-14 (Piper Super Cub)

This airplane was purchased in May 1952 for contract aircraft supervision, survey work and later to be used as a sprayer and duster.

Except for the inspection necessary on all aircraft after each 100 hours of use, no repairs or maintenance were necessary to ready it for the 1953 season.

A table on page 40 lists all Bureau aircraft with descriptions of the engines and dispersal equipment.

DESCRIPTION OF BEPQ AIRCRAFT
U. S. Department of Agriculture

December 31, 1952

Type and CAA Number	BEPQ No.	Headquartered At	Engine Mfr.	Total H.P.	Special Equipment		
					Hopper Cu.Ft.	Tank Cap. Gal.	Pump Type Driven By
Douglas 75029	1	Oklahoma City	P & W	2400	585	1020	Centrifugal Hydraulics
Douglas 816	2	Oklahoma City	P & W	2400		922	Centrifugal Gas Engine
Cessna 2234D	3**	Oklahoma City	Cont.	145			
Cessna 9354A	4*	Beltsville	Jacobs	300			
Cessna 2494D	5*	Portland	Cont.	145			
Stearman 55692	6	Oklahoma City	P & W	450		150	Turbine Hydraulics
Stearman 1380V	7	Oklahoma City	Lycoming	300		130	Centrifugal Hydraulics
Stearman 9487H	8	Beltsville	Lycoming	220		80	Cent. & Gear Wind & Eng.
Stearman 9488H	9	Beltsville	Lycoming	220		70	Centrifugal Wind
Stearman 1218V	10	Forest Grove	Lycoming	300		40	Centrifugal Wind
N3N 45009	11	Oklahoma City	P & W	450	23	90	Centrifugal Wind
N3N 45266	12	Oklahoma City	Wright	285		90	Gear Wind
N3N 45036	13	Forest Grove	Lycoming	300	15		Wind
Piper 1908A	14**	Oklahoma City	Cont.	125			

* Aerial photographic equipment installed.

** Used for survey and supervisory work on Bureau and cooperative assignments.

TIME FLOWN BY BUREAU AIRCRAFT IN 1951 AND 1952

Type and CAA No.	BEPQ No.	Headquartered At	Type of Work	Hours	
				1951	1952
Douglas	75029	1 Oklahoma City	Spraying-Baiting	96	300
Douglas	816	2 Oklahoma City	Spraying	123	220
1/ Cessna	2234D	3 Oklahoma City	Supervising-Surveying	-	208
Cessna	9354A	4 Beltsville	Photo.-Surveying	244	275
1/ Cessna	2494D	5 Portland	Photo.-Surveying	-	256
2/ Stearman	55692	6 Oklahoma City	Spraying	123	-
3/ Stearman	1380V	7 Oklahoma City	Spraying	72	126
Stearman	9487H	8 Beltsville	Research Spraying	42	14
Stearman	9488H	9 Beltsville	Research Spraying	38	19
Stearman	1218V	10 Forest Grove	Research Spraying	60	52
N3N	45009	11 Oklahoma City	Spraying-Baiting	224	268
N3N	45266	12 Oklahoma City	Spraying	90	240
N3N	45036	13 Forest Grove	Research Dusting	17	18
1/ Piper	1908A	14 Oklahoma City	Supervising-Surveying	-	332

- 1/ BEPQ No. 3 purchased in April 1952, No. 5 in July 1952 and No. 14 in May 1952.
2/ BEPQ No. 6 not used in 1952. Undergoing modification.
3/ BEPQ No. 7. New high-lift wings completed May 25, 1952. Used on experiments in cooperation with Agricultural Colleges, State agencies, Aerial Applicators Association, BPISAE, Bureau projects and demonstrations at Agricultural Spraying Conferences.

AIRCRAFT CONTROL OPERATIONS - 1952 SEASON

Amount and Cost (in dollars) of Control Work Done by Each Airplane Headquartered at the Aircraft and Special Equipment Center

BEPQ NO.	GAS AND OIL	MTCE. AND REPAIR	ENGINE DEPRECIATION 1/	ENGINE DEPRECIATION 2/	AIRCRAFT DEPRECIATION 3/	PILOT SALARY & EXPENSES	TOTAL COSTS	HOURS FLOWN 4/	ACRES TREATED 5/	COST PER ACRE	PROJECT	LOCATION
1	1370	424	358	745	378	3275	30	18,326	.18	GHC	Ariz.	
	2496	1002	770	1605	888	6761	64	85,000	.08	MCC	Nev.	
	1818	828	590	1230	1033	5499	49	31,650	.17	GMC	N. Eng.	
	3656	1769	1114	2320	1767	10626	93	69,186	.15	GHC	Wyo.Mont.Ida.	
	1929	776	466	970	555	4696	39	58,650	.08	GHC	Ariz.	
Totals	11269	4799	3298	6870	4621	30857	275	262,812	.12 Av.			
2	3303	2381	1037	2160	2608	11489	86	82,495	.14	GMC	N. Eng.	
	2953	2347	803	1673	1994	9770	67	55,413	.18	GHC	Wyo. Mont.	
	2399	1220	709	1478	893	6699	59	94,876	.07	GHC	Ariz.	
Totals	8655	5948	2549	5311	5495	27958	212	232,784	.12 Av.			
3	307	220	154	602	6/	1283	122	6/	6/	Sp.Bdwm.	Ore. Wash.	
11	1428	1052	805	1343	2373	7001	201	52,469	.13	MCC-GHC	Nev. Utah Wyo	
12	1341	600	962	1603	2356	6862	240	32,272	.21	GHC		
14	491	78	141	527	6/	1237	206	6/	6/	GMC	N. Eng.	

- 1/ Includes labor and expense of mechanics, hired maintenance, and all small parts necessary for normal operations.
- 2/ Engine depreciation computed on hourly basis for replacement or major overhaul.
 - a. BEPQ 1 & 2 (each engine) 500 hrs. between overhauls @ \$3000
 - b. BEPQ 11 & 12 " " " 2000
 - c. BEPQ 3 " " " 750
 - d. BEPQ 14 " " " 600
- 3/ Aircraft depreciation computed at purchase price or evaluated price when procured, plus dispersal installation costs, prorated on a 10 year basis.
- 4/ Ferry time from Okla. City to project locations and return is included in hours flown for each project.
- 5/ Acres shown are actual acres treated. Most Mormon Cricket areas and some grasshopper areas were strip-baited and acres controlled is more than the acres treated.
- 6/ Airplane used for supervising contract aircraft.

